Amendments to the claims:

1. (Currently Amended) A method for operation of an image-generating optical system for detection of characteristic quantities of the wavelength-dependent behavior of an illuminated specimen, such as the emission behavior and/or absorption behavior and, in particular, the fluorescence and/or luminescence and/or phosphorescence and/or enzyme-active light emission and/or enzyme-active fluorescence, for the operation of a laser scanning microscope, comprising the steps of:

splitting the image point information of the specimen into spectral components in a spatially resolved manner on the detection side in dependence on wavelength; and

carrying out at least one summing for different spectral components, wherein a change in at least one irradiation wavelength and/or irradiation intensity is carried out within a scanning process between different specimen regions and a summing of at least some of the respective spectral components is carried out for different specimen regions and/or irradiation wavelengths/intensities;

displaying the summed regions as images.

Claims 2-3. (Cancelled)

4. (Previously Presented) The method according to claim 1, wherein a plurality of partial sums is formed and then added.

5. (Previously Presented) The method according to claim 1, with an overlapping of partial sums of spectral components containing the overlapped signals of different fluorescence components.

6. (Currently Amended) The method according to claim 1, further including determining ~~the combination with~~ spectral centroid formation for a plurality of spectral components.

7. (Previously Presented) The method according to claim 1, with mathematical combination such as division and subtraction of partial sums or individual components and graphic representation of the combination.

8. (Previously Presented) The method according to claim 1, for optical detection of characteristic quantities of the wavelength-dependent behavior of an illuminated specimen, such as the emission behavior and/or absorption behavior, in particular, the fluorescence and/or luminescence and/or phosphorescence and/or enzyme-active light emission and/or enzyme-active fluorescence, wherein the emission radiation is split spectrally by a dispersive element, detected in a spatially resolved manner and at least one sum signal of the emission radiation and/or of the absorbed radiation is determined electronically.

9. (Previously Presented) The method according to claim 1, wherein the sum signal of the spectrally split emission radiation is determined for distinguishing different dyes and/or for determining the local dye composition of an image point when a plurality of dyes are used simultaneously and/or for determining the local shift of the emission spectrum depending on the local environment to which the dye or dyes is or are attached and/or for measuring emission ratio dyes for determining ion concentrations.

10. (Previously Presented) The method according to claim 1, wherein the sum signal of the spectrally expanded, reflected, backscattered and/or transmitted excitation radiation of fluorochromes is carried out for distinguishing different dyes and/or for determining the local dye composition of an image point when a plurality of dyes are used simultaneously and/or for determining the local shift in the absorption spectrum depending on the local environment to which the dye or dyes is or are attached and/or for measuring the absorption ratio for determining ion concentrations.

11. (Previously Presented) The method according to claim 1, wherein the composition of the sum signals can be varied during scanning as a function of the excitation parameters (multitracking).

12. (Previously Presented) The method according to claim 1, wherein the composition of the sum signals can be varied during scanning as a function of the respective scanning position (ROI tracking).

13. (Previously Presented) The method according to claim 1, wherein the emission radiation of the specimen is split by a dispersive element and is detected in a spatially resolved manner in at least one direction.

14. (Previously Presented) The method according to claim 1, wherein a splitting of the fluorescence radiation is carried out.

15. (Previously Presented) The method according to claim 1, wherein the radiation that is reflected, backscattered and/or transmitted by the specimen is split by a dispersive element and is detected in a spatially resolved manner in at least one direction for absorption measurement.

16. (Previously Presented) The method according to claim 1, wherein the signals of detection channels are converted and digitally read out and summing is carried out digitally in a computer.

17. (Previously Presented) The method according to claim 1, wherein the summing is carried out with analog data processing by a demultiplexer in combination with a summing amplifier.

18. (Currently Amended) The method according to claim 1, wherein the signals of ~~the~~ detector channels are influenced by a nonlinear distortion of the input signals.

19. (Currently Amended) The method according to claim 1, ~~wherein the integration parameters are influenced~~ further comprising integrating the signal from a detection channel over a predetermined time.

20. (Previously Presented) The method according to claim 1, wherein the characteristic or response curve of an amplifier is influenced.

21. (Previously Presented) The method according to claim 1, wherein the sum signal is used for generating an image.

22. (Previously Presented) The method according to claim 1, wherein a color-coded fluorescence image is generated.

23. (Previously Presented) The method according to claim 1, wherein a superposition is carried out with additional images.

24. (Previously Presented) The method according to claim 1, wherein the sum signals are combined with a lookup table.

25. (Previously Presented) The method according to claim 1, wherein representation of different dyes and/or the spread of the generated image is carried out by the lookup table.

26. (Previously Presented) The method according to claim 1, wherein a comparison of the measured signal with a reference signal is carried out via comparators in detection channels and in case the reference signal is not reached and/or is exceeded a change in the operating mode of the detection channel is carried out.

27. (Previously Presented) The method according to claim 1, wherein the respective detection channel is switched off and/or not taken into account.

28. (Previously Presented) The method according to claim 27, wherein the spectral region of interest is narrowed in this way.

29. (Previously Presented) The method according to claim 1, wherein the signals of the detection channels are generated by at least one integrator circuit.

30. (Previously Presented) The method according to claim 1, wherein the signals of the detection channels are generated by photon counting and subsequent digital-to-analog conversion.

31. (Currently Amended) The method according to claim ~~1~~ 30, wherein ~~the~~ photon counting is carried out in time correlation.

32. (Previously Presented) The method according to claim 1, for detection of single-photon and/or multiphoton fluorescence and/or fluorescence excited by entangled photons.

33. (Previously Presented) The method according to claim 1, with parallel illumination and detection, such as in ingredient screening, wherein the specimen is a microtiter plate.

34. (Previously Presented) The method according to claim 1, incorporated in a microscope.

35. (Previously Presented) The method according to claim 1, for detection in a nearfield scanning microscope.

36. (Previously Presented) The method according to claim 1, for detection of a single-photon and/or multiphoton dye fluorescence in a fluorescence-correlated spectroscope.

37. (Currently Amended) The method according to claim 1, ~~employiing~~ employing confocal detection.

38. (Previously Presented) The method according to claim 1, employing a scanning arrangement.

39. (Previously Presented) The method according to claim 1, employing illumination means with an X-Y scanner.

40. (Previously Presented) The method according to claim 1, employing an X-Y scan table.

41. (Previously Presented) The method according to claim 1, employing nonconfocal detection.

42. (Previously Presented) The method according to claim 1, employing a scanning arrangement.

43. (Previously Presented) The method according to claim 1, employing descanned detection.

44. (Previously Presented) The method according to claim 1, employing brightfield imaging.

45. (Previously Presented) The method according to claim 1, employing point imaging.

46. (Previously Presented) The method according to claim 1, employing non-descanned detection.

47. (Previously Presented) The method according to claim 1, employing non-scanning, confocal or nonconfocal detection and point imaging or brightfield imaging.

48. (Currently Amended) An arrangement for optical detection of characteristic quantities of the wavelength-dependent behavior of an illuminated specimen, such as the emission behavior and/or absorption behavior and, in particular, the fluorescence and/or luminescence and/or phosphorescence and/or enzyme-active light

emission and/or enzyme-active fluorescence, comprising:

a dispersive element for splitting the emission radiation spectrally;

a detector for detecting a radiation signal; and

means for electronically determining at least one sum signal of the emission radiation and/or of the absorbed radiation;

wherein a change in at least one irradiation wavelength and/or irradiation intensity is carried out within a scanning process between different specimen regions and a summing of at least some of the respective spectral components is carried out for different specimen regions and/or irradiation wavelengths/intensities.

49. (Previously Presented) The arrangement according to claim 48, wherein the sum signal of the spectrally split emission radiation is determined for distinguishing different dyes and/or for determining the local dye composition of an image point when a plurality of dyes are used simultaneously and/or for determining the local shift of the emission spectrum depending on the local environment to which the dye or dyes is or are attached and/or for measuring emission ratio dyes for determining ion concentrations.

50. (Previously Presented) The arrangement according to claim 48, wherein the sum signal of the spectrally expanded, reflected, backscattered and/or transmitted excitation radiation of fluorochromes is carried out for distinguishing different dyes and/or for determining the local dye composition of an image point when a plurality of dyes are used simultaneously and/or for determining the local shift in the absorption spectrum depending on the local environment to which the dye or dyes is or are attached and/or for measuring the absorption ratio for determining ion concentrations.

51. (Currently Amended) The arrangement according to claim ~~1~~ 48, wherein the composition of the sum signals can be varied during scanning (multitracking).

52. (Currently Amended) The arrangement according to claim ~~1~~ 48, wherein the composition of the sum signals can be varied during scanning (ROI tracking).

53. (Currently Amended) The arrangement according to claim ~~1~~ 48, wherein the emission radiation of the specimen is split by a dispersive element and is detected in a spatially resolved manner in at least one direction.

54. (Currently Amended) The arrangement according to claim ~~1~~ 48, wherein a splitting of the fluorescence radiation is carried out.

55. (Currently Amended) The arrangement according to claim ~~1~~ 48, wherein the radiation that is reflected or transmitted by the specimen is split by a dispersive element and is detected in a spatially resolved manner in at least one direction for absorption measurement.

56. (Currently Amended) The arrangement according to claim ~~1~~ 48, wherein the signals of detection channels are converted and digitally read out and summing is carried out digitally in a computer.

57. (Currently Amended) The arrangement according to claim ~~1~~ 48, wherein the summing is carried out with analog data processing by a demultiplexer in combination with a summing amplifier.

58. (Currently Amended) The arrangement according to claim ~~1~~ 48, wherein the signals of ~~the~~ detector channels are influenced by a nonlinear distortion of the input signals.

59. (Currently Amended) The arrangement according to claim ~~1~~ 48, ~~wherein the integration parameters are influenced~~ further comprising integrating the signal from a detection channel over a predetermined time.

60. (Currently Amended) The arrangement according to claim ~~1~~ 48, wherein the characteristic or response curve of an amplifier is influenced.

61. (Currently Amended) The arrangement according to claim ~~1~~ 48, wherein

the sum signal is used for generating an image.

62. (Currently Amended) The arrangement according to claim ~~1~~ 48, wherein a color-coded fluorescence image is generated.

63. (Currently Amended) The arrangement according to claim ~~1~~ 48, wherein a superposition is carried out with additional images.

64. (Currently Amended) The arrangement according to claim ~~1~~ 48, wherein the sum signals are combined with a lookup table.

65. (Currently Amended) The arrangement according to claim ~~1~~ 48, wherein representation of different dyes and/or the spread of the generated image is carried out by the lookup table.

66. (Currently Amended) The arrangement according to claim ~~1~~ 48, wherein a comparison of the measured signal with a reference signal is carried out via comparators in detection channels and in case the reference signal is not reached and/or is exceeded a change in the operating mode of the detection channel is carried out.

67. (Currently Amended) The arrangement according to claim ~~1~~ 48, wherein the respective detection channel is switched off and/or not taken into account.

68. (Currently Amended) The arrangement according to claim 67, wherein the spectral region of interest is narrowed in this way.

69. (Currently Amended) The arrangement according to claim ~~1~~ 48, wherein the signals of the detection channels are generated by at least one integrator circuit.

70. (Currently Amended) The arrangement according to claim ~~1~~ 48, wherein the signals of the detection channels are generated by photon counting and subsequent digital-to-analog conversion.

71. (Currently Amended) The arrangement according to claim ~~1~~ 70, wherein ~~the~~ photon counting is carried out in time-correlated manner.

72. (Currently Amended) The arrangement according to claim ~~1~~ 48, for detection of single-photon and/or multiphoton fluorescence and/or fluorescence excited by entangled photons.

73. (Currently Amended) The arrangement according to claim ~~1~~ 48, with parallel illumination and detection, such as in ingredient screening, wherein the specimen is a microtiter plate.

74. (Currently Amended) The arrangement according to claim ~~1~~ 48, incorporated in a microscope.

75. (Currently Amended) The arrangement according to claim ~~1~~ 48, for detection in a nearfield scanning microscope.

76. (Currently Amended) The arrangement according to claim ~~1~~ 48, for detection of a single-photon and/or multiphoton dye fluorescence in a fluorescence-correlated spectroscope.

77. (Currently Amended) The arrangement according to claim ~~1~~ 48, employing confocal detection.

78. (Currently Amended) The arrangement according to claim ~~1~~ 48, employing a scanning arrangement.

79. (Currently Amended) The arrangement according to claim ~~1~~ 48, employing an X-Y scanner in the illumination means.

80. (Currently Amended) The arrangement according to claim ~~1~~ 48, employing

an X-Y scan table.

81. (Currently Amended) The arrangement according to claim ~~1~~ 48, employing nonconfocal detection.

82. (Currently Amended) The arrangement according to claim ~~1~~ 48, employing a scanning arrangement.

83. (Currently Amended) The arrangement according to claim ~~1~~ 48, employing descanned detection.

84. (Currently Amended) The arrangement according to claim ~~1~~ 48, employing brightfield imaging.

85. (Currently Amended) The arrangement according to claim ~~1~~ 48, employing point imaging.

86. (Currently Amended) The arrangement according to claim ~~1~~ 48, employing non-descanned detection.

87. (Currently Amended) The arrangement according to claim ~~1~~ 48, employing non-scanning, confocal or nonconfocal detection and point imaging or brightfield imaging.

88. (New) A method for operation of an image-generating optical system for detection of characteristic quantities of the wavelength-dependent behavior of an illuminated specimen, such as the emission behavior and/or absorption behavior and, in particular, the fluorescence and/or luminescence and/or phosphorescence and/or enzyme-active light emission and/or enzyme-active fluorescence, for the operation of a laser scanning microscope, comprising the steps of:

splitting the image point information of the specimen into spectral components in a spatially resolved manner on the detection side in dependence on wavelength; and

carrying out at least one summing for different spectral components, wherein a change in at least one irradiation wavelength and/or irradiation intensity is carried out within a scanning process between different specimen regions and a summing of at least some of the respective spectral components is carried out for different specimen regions and/or irradiation wavelengths/intensities;

wherein the composition of the sum signals can be varied during scanning as a function of the excitation parameters (multitracking) or as a function of the respective scanning position (ROI tracking);

displaying the summed regions as images.